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$$x = 2pq = 8mn(m^2 + n^2), \qquad y = p^2 - q^2 = (4mn)^2 - (m^2 + n^2)^2,$$

$$z = \frac{pq(r^2 - s^2)}{rs} = \frac{2mn[4(m^2 - n^2)^2 - (m^2 + n^2)^2]}{m^2 - n^2}.$$

Reducing the foregoing values of x, y, z to a common deominator $m^2 - n^2$ and then discarding it, we finally have

$$x = 8mn(m^2 - n^2)(m^2 + n^2),$$

$$y = (m^2 - n^2)[(4mn)^2 - (m^2 + n^2)^2],$$

$$z = 2mn[4(m^2 - n^2)^2 - (m^2 + n^2)^2].$$

Take $m = 2$, $n = 1$ and we get $x = 240$, $y = 117$, $z = 44$, the smallest values known. The diagonals of the faces are 267, 244, 125.

Also solved by C. B. HALDEMAN and L. E. LUNN.

2664. Proposed by J. W. NICHOLSON, Baton Rouge, La.

Find the sum of the series, $\frac{1}{3} - \frac{2}{15} + \frac{3}{35} - \cdots + (-1)^{n+1}\frac{n}{(2n-1)(2n+1)}$.

SOLUTION BY S. W. REAVES, University of Oklahoma.

The exponent of -1 in the general term should obviously be $n + 1$. Making this correction, the general term may be written,

$$(-1)^{n+1}\frac{n}{(2n-1)(2n+1)} = \tfrac{1}{2}(-1)^{n+1}\left(\frac{n}{2n-1} - \frac{n}{2n+1}\right).$$

Let S denote the required sum. Then

$$S = \frac{1}{2}\left[\sum_{i=1}^{n}(-1)^{i+1}\frac{i}{2i-1} + \sum_{i=1}^{n}(-1)^{i+2}\frac{i}{2i+1}\right]$$

$$= \frac{1}{2}\left[\left(1 - \tfrac{2}{3} + \tfrac{3}{5} - \cdots + (-1)^{n+1}\frac{n}{2n-1}\right) + \left(\tfrac{1}{3} + \tfrac{2}{5} - \cdots + (-1)^{n+2}\frac{n}{2n+1}\right)\right]$$

$$= \frac{1}{2}\left[1 - 1 + 1 - 1 + \cdots + (-1)^{n+2}\frac{n}{2n+1}\right].$$

If n be even, $S = \frac{n}{4n+2} = \frac{1}{4}$ when n is infinite.

If n be odd, $S = \frac{n+1}{4n+2} = \frac{1}{4}$ when n is infinite.

Also solved by BANCROFT H. BROWN, E. H. WORTHINGTON, E. B. ESCOTT, GEORGE F. WILDER, PAUL CAPRON, HORACE OLSON, ELIJAH SWIFT, and ARNOLD DRESDEN.

2665. Proposed by CLIFFORD N. MILLS, Brookings, S. Dak.

A telegraph wire, which weighs 1/10 lb. per yard, is stretched between poles on a level ground so that the greatest dip of the wire is 3 feet. Find, approximately, the distance between the poles when the tension at the lowest point of the wire is 140 pounds.

SOLUTION BY G. PAASWELL, New York City.

MacMahon's *Hyperbolic Functions*, pages 47 to 51 discusses the two cases here, (*a*) when the wire is taken as inextensible, and (*b*) as extensible. Under (*a*) $y/c = \sec\varphi$; $x/c = gd^{-1}\varphi = \log_e \tan(\pi/4 + \varphi/2)$. The origin is the point midway between the poles and a distance c below the lowest point of the wire. Use the yard as the unit of length. $c = H/w = 140/0.1 = 1400$. $y = 1 + c = 1401$. Whence, $\varphi = 2° 9' 54''$. Thence, $x = 52.913$ and since $L = 2x$, the re-